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XXIV.—*The African Element in the Fauna of India: a Criticism of Mr. Wallace's views as expressed in the 'Geographical Distribution of Animals.'* By W. T. BLANFORD, F.R.S. &c.

SOME years since I read a short paper before the British Association *, in which I pointed out that the fauna of a large portion of the Indian peninsula had stronger African than Malayan affinities. With the exception of a note on the distribution of Indian reptiles which I published in 1870 †, and in which I briefly indicated the different zoological provinces and subprovinces existing in India, I have not returned to the subject; and as I have never published the details upon which my views were founded, I am not surprised to find that my opinion has had but little weight with any who had not a personal knowledge of the country. My principal reason for waiting until I had more leisure was a hope that I might be able to examine into the authenticity of many admitted genera, since I have long been convinced that many of the usual generic groups are artificial; and some are even founded upon geographical distribution—forms which inhabit Africa being placed in a different genus from those which inhabit India on account of a difference in the locality, and not of a difference in structure. I was especially desirous also of working out the very difficult question of terrestrial Mollusca, the distribution of which, as Mr. Wallace has just pointed out in his

* Brit. Assoc. Rep. 1869, p. 107.

† J. A. S. B. xxxix. pt. ii. p. 335.

'Geographical Distribution of Animals,' whilst agreeing in some respects with that of the Vertebrata, presents some very singular anomalies.

Views more or less coinciding with my own have been subsequently expressed by the late Mr. Blyth* and Dr. Stoliczka †, and by Herr A. von Pelzeln ‡; but, except by the latter, no details have been given. Mr. Elwes §, on the other hand, whilst adopting my principal divisions, considered that I had overrated the importance of the African element and underrated the general distribution of Malay genera. Mr. Elwes's paper referred solely to the distribution of birds—which had one advantage, that more had been published about the class than about any other, and at least one disadvantage, viz. that birds, being all more or less vagrants and having greater facilities for moving long distances than the vast majority of the members of other classes, are enabled to colonize isolated spots (such as hill-tops) far from their own region. The Indian hill-tops afford a pleasanter climate than the plains, and are much utilized by Anglo-Indians as sanatoria; consequently their fauna is frequently far better known than that of the plains around them.

The appearance of Mr. Wallace's great work on geographical distribution will, it may be hoped, form an epoch in the study of this most important and much neglected branch of zoological science. The subject has never before been treated in an equally thorough manner, and it is difficult to overrate the obligation of all naturalists to the author. I very greatly regret that the pressure of other work has prevented me from hitherto publishing a number of details with reference to the fauna of India, which would, I think, have greatly modified Mr. Wallace's views. With only the facts procurable from museum catalogues and other published works, I know from experience that it is impossible to ascertain correctly the details of distribution; the numerous errors committed by the older naturalists, by whom the term India was used in the very loosest and vaguest sense, have but rarely been eliminated; and it is constantly the practice in monographs and catalogues to quote species and genera as found in two localities—the old and erroneous one, and the real locality subsequently discovered. Moreover, even in works of so high a class and so

* Nature, 1871, March 30, p. 427; Catalogue of Mammals and Birds of Burma, J. A. S. B. 1875, pt. ii. extra number, Introduction, p. xv.

† J. A. S. B. 1869, pt. ii. p. 202; 1870, pt. ii. p. 280; Proc. A. S. B. 1871, p. 84.

‡ "Afrika-Indien," Verh. k.-k. zool.-bot. Gesellsch. Wien, 1875, p. 33.
§ P. Z. S. 1873, pp. 652, 669, &c.

accurate as Jerdon's 'Mammals' and 'Birds' generally are in questions of distribution, some geographical expressions are very loosely used. Thus when Jerdon uses the term Central India, he sometimes means the country near Nágpúr, sometimes the region known politically as Central India, comprising Rájputána, Indore, and Gwalior, sometimes Chutia Nágpúr, a tract of country with a very different fauna.

I regret to say that I have not now time to give even the details I have accumulated on the subject; all I can do is to attempt a meagre criticism of Mr. Wallace's lists of the fauna of India; but I think I can show that there really is better reason than Mr. Wallace supposes for inferring a distinct relationship between the fauna of the greater part of India and that of Africa. Were the African affinities of the Indian fauna so small as would be inferred from the details given in the 'Geographical Distribution of Animals,' vol. i. pp. 321-326, I should have to confess that I had committed a great error, and that Messrs. Blyth and Stoliczka were equally mistaken in insisting on the strong Ethiopian affinities of the Indian fauna. A little consideration will, I think, show that in some cases Mr. Wallace is mistaken, and that a careful analysis of the whole question will lead to a different conclusion.

Before proceeding to criticise Mr. Wallace's lists I have two remarks to make. I will preface them by saying that nothing is further from my wish than to express an unfavourable opinion of Mr. Wallace's work. I believe that he has done his best to arrive at an unbiassed conclusion, and that where he has failed, as in this instance I think he has, the fault is chiefly that of the authorities on whom he had to depend.

The first remark I have to make is this:—India is in connexion with the Indo-Malay countries; and wide-ranging species, of mammals and birds especially, find no impediment in extending themselves throughout. This acts in two ways. It hinders a tendency to the formation of distinct types through isolation; and when a species by ranging to a distant region becomes modified the links in the chain of modified forms are more or less well preserved. If the whole of Burma, the Malay peninsula, Siam, Sumatra, Java, and the other countries between India and China, south of the limits of the Palæartic region, and as far east as the parallel of Canton, had been buried beneath the sea since, at all events, a period long antecedent to the glacial epoch, if, moreover, a belt of well-wooded country extended across the Indian Ocean and connected Eastern Africa with India, we should probably find

that the fauna of India would differ from that of Eastern China or of Borneo far more than it now does, and we should then have a fairly parallel example of the differences now existing between India and Africa. Consequently, if we wish to form a true conception of the relations between the fauna of Africa and that of India, we must be prepared to take into consideration the alliances between distinct subgenera and sometimes between different genera. The question cannot be determined by ascertaining what forms are common in a list of such mammalian genera as were adopted, for instance, by Dr. Gray, many of which are not accorded more than specific rank by most naturalists, because in all probability Africa has been separated from India long enough for the same or allied species in the two regions, even if they had not varied at the time of separation, to have become sufficiently distinct to be classed in different subgenera. This is emphatically the case when, as happens in several instances, the living Ethiopian representatives of Oriental genera are confined to Western Africa.

The second remark is, that although I concur with Mr. Wallace in separating from the rest of India a Ceylonese, or, as I have generally called it, a Malabar province or subregion, I cannot agree with the limits laid down in the map at p. 315, vol. i. of the 'Geographical Distribution of Animals.' I am also inclined to modify several of the other boundaries laid down. I have traversed so large a portion of the Indian peninsula that I have had unusual opportunities for ascertaining the limits of the different subregions; and I see no ground for changing the views I expressed in 1870*. The divisions I then proposed were the following:—

1. The Panjáb province or subregion, including the Panjáb, Sind, Cutch, and Western Rájputána.

2. The Indian province or subregion—the peninsula generally, with the exception of the Panjáb and Malabar provinces, but with the addition of Northern Ceylon.

3. The Malabar province or subregion with Southern Ceylon. This corresponds generally to Mr. Wallace's Ceylonese subregion—a name I should willingly adopt, but that part of Ceylon does not belong to it, whilst the whole of Malabar does. This province comprises the low country on the west coast of India from Cape Comorin to a little north of Bombay, and the range of hills near the same coast as far north probably as the Tapti river. It also includes the hill tract of Southern Ceylon, but not the plains in the northern part of the island. Its fauna is represented, more-

* J. A. S. B. 1870, pt. ii. p. 336.

over, on several isolated hill groups in Southern India, the number of representative forms apparently diminishing gradually to the northward. The best-known of these groups is that of the Shevroy hills, near Salem. The plains of the Carnatic from the Krishna (Kistna) river to Cape Comorin are included in this region by Mr. Wallace; but in this he is certainly in error; and he has, I think, been misled by incorrect localities for some typical forms, such as the Uropeltidæ*.

4. The Eastern-Bengal province. This is limited on the west by a line drawn northwards from the head of the Bay of Bengal. Calcutta is just on the edge, and perhaps rather within than without it. It belongs to Mr. Wallace's Indo-Chinese subregion, the limit of which I should be inclined to draw a little further to the westward than he does. This, however, is a trifling detail.

I further subdivided the Indian province into subprovinces, as below:—

a. Gangetic subprovince or Hindustan †, extending south as far as the Nerbudda, in its eastern portion comprising only the valley of the Son and the Gangetic plain as far east as Benares.

b. Deccan subprovince—from the Nerbudda to the Krishna, bounded on the west by a line drawn a little east of the crest of the Western Ghats or Syahádrí range, and on the east by a line drawn nearly north and south a little east of Nágpúr.

c. Bengal subprovince—bounded by the last on the west, and extending as far south as the Godávári.

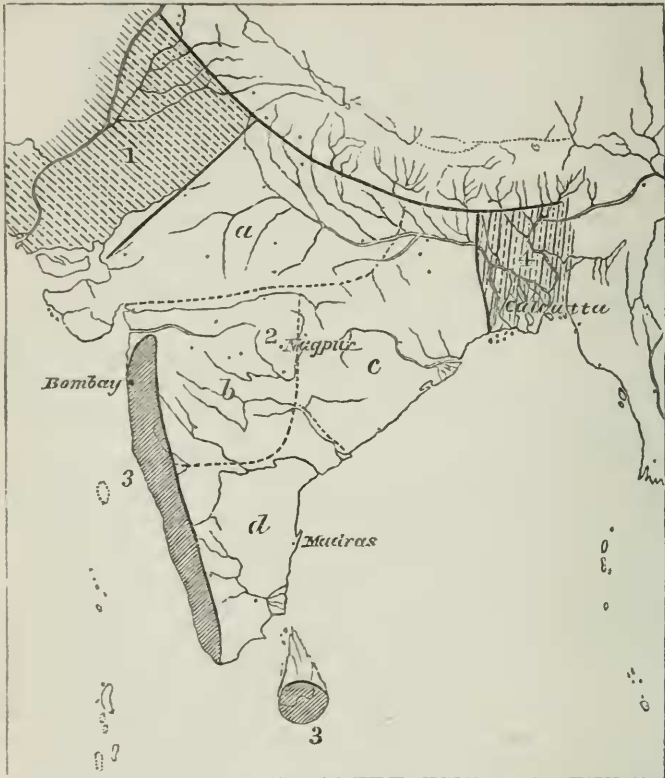
d. Madras subprovince—all the peninsula south of the Krishna river and to the eastward south of the Godávári, and east of the Nilgiri and other hills belonging to the range of the Western Ghats. The upper portions of some small isolated hill-ranges, however, such as the Shevroys and Kolamullies, have a Malabar fauna. This Madras subprovince also includes Northern Ceylon.

My provinces correspond to Mr. Wallace's subregions. The accompanying small map (p. 282) shows the approximate limits of the provinces and subprovinces. It is as well, since I have evidently been misunderstood, to say that the subdivision proposed refers solely to the Indian peninsula. The Eastern-

* This family of snakes is entirely confined to the province or subregion I have defined. Colonel Beddome, by far the best authority on South-Indian Reptilia, has pointed out that no Uropeltidæ are ever found in the plains of the Madras Presidency, except on the west coast.

† I pointed out that by natives of India this term is applied to the Upper Gangetic plain, and not, as it is by European geographers, to the whole of India.

Bengal province is part of the Indo-Malay region to the eastward; the Panjáb province, the limits of which were quite unknown to me in 1870, I now find to be part of a very well-marked province or subregion which extends along the shores



1. Panjáb province or subregion.
2. Indian province: *a*, Gangetic subprovince; *b*, Deccan subprovince; *c*, Bengal subprovince; *d*, Madras subprovince.
3. Malabar province.
4. Eastern-Bengal province.

of the Arabian Sea and to the head of the Persian Gulf, and contains throughout a curious mixture of Palæartic and Indian forms with a prevalence of desert types of animals and plants. Its approximate limits to the westward coincide with those of *Gazella Bennetti*, and are shown in a little map published in the 'Proceedings of the Zoological Society' *.

* 1873, p. 314. I may mention that I have since ascertained that the only species of *Gazella* found in Sind and the desert country to the eastward is *G. Bennetti*.

I may add that I now doubt whether there is any difference between the fauna of the Gangetic and Deccan subprovinces sufficient to justify the retention of the distinction. The only importance attached to these subprovinces is that Malay forms are more numerous in the Bengal and Madras subprovinces than elsewhere. The Malabar forms are closely affined to Malay types as a rule, although some are peculiar. I will mention one instance of the distinctions which have led me to suggest the formation of these subprovinces. The families *Cyclophoridae* and *Diplommatinidae*, amongst the terrestrial Mollusca, are remarkably well represented throughout the Oriental region. Both abound in the Himalayas and in Malabar, the *Cyclophoridae* being even more richly represented in the latter province. In the Madras subprovince *Diplommatinidae* are found on the hills with a Malabar fauna but not elsewhere; and they have not, so far as I am aware, been found in the Bengal subprovince, nor elsewhere in the Indian province. Forms of *Cyclophoridae* are found throughout the Bengal and Madras subprovinces; but none are known in the Gangetic and Deccan subprovinces. A Cylostomoid genus *Cyclotopsis* is found in the Deccan and Gangetic subprovinces; but the family of *Cylostomidae* has a totally different geographical distribution from that of the *Cyclophoridae*, and the only other known species of *Cyclotopsis* occurs in the Seychelle Islands*.

With these few preliminary remarks I pass to the review of Mr. Wallace's lists. The first is the list of genera of Mammalia which inhabit the subregion of Hindustan†. These are 38 in number; and Mr. Wallace remarks that "8 have so wide a distribution as to give no special geographical indications. Of the remaining 30, whose geographical position we have noted, 14 are Oriental only, 5 have as much right to be considered Oriental as Ethiopian, extending as they do over the greater part of the Oriental region; 2 (the hyæna and gazelle) show Palaearctic rather than Ethiopian affinity; 7 are Palaearctic and Oriental, but not Ethiopian; and only 2 (*Cynalurus* and *Mellivora*) can be considered as exclusively Ethiopian."

The genera not mentioned by Mr. Wallace are chiefly bats,

* It is as well to point out that the classification usually adopted for terrestrial Mollusca is largely artificial, and founded on characters of secondary importance. The value of trifling peculiarities in the operculum in especial has been much overrated; and the order Pulmonifera of most writers comprises forms belonging to two distinct orders.

† L. c. p. 322.

the Ethiopian affinities of which are quite as strong as their Malayan relations, and certain rodents, *Leggada* and *Golunda*, which are said to have Ethiopian representatives, and which have certainly not hitherto been traced into the Malay countries. I will omit these; but, in justice to Mr. Wallace's views, I must add a very important genus to the list. *Tupaia Elliotti* has recently been found both in the Bengal and Deccan subprovinces of the Indian subregion, and it must therefore be added to the Indian fauna. As the distribution and affinities of the Mammalia are better known than those of any other class, I shall go into a few details; and to show the affinities of the 38 genera I will take them seriatim with Mr. Wallace's remarks on each between brackets.

1. *Presbytes* (Oriental only). Replaced throughout the Ethiopian region by the allied genus *Colobus*.
2. *Macacus* (Oriental only). One species occurs in Northern Africa. Allied genera are found in the Ethiopian region, e. g. *Cercopithecus*; but the alliance is perhaps less close than in the case of *Presbytes*.
3. *Erinaceus* (Palæartic genus). Found also in Central and Southern Africa, but absent and not replaced by any closely allied genus in Malayasia. *Gymnura* is placed in the same family by Mr. Wallace, but by others it is classed with *Tupaia*, and is certainly not a near ally of *Erinaceus*.
4. *Sorex* (widely distributed). The subgenera require further study before their distribution can be considered determined.
5. *Felis* (almost cosmopolitan).
6. *Cynaelurus* (Ethiopian and S. Palæartic). I am not sure that this is fully entitled to generic rank.
7. *Viverra* (Ethiopian and Oriental to China and Malaya).
8. *Viverricula* (Oriental only). This is at the most a subgenus of *Viverra*, and has no title to generic rank.
9. *Paradoxurus* (Oriental only). The species found in Western Africa, *P. binotatus*, has been made a distinct genus by Gray; but it appears doubtful if the distinctions pointed out are of sufficient importance to justify generic separation. In any case *Nandinia*, as the African form is called, is very closely allied.
10. *Herpestes* (Ethiopian, South-Palæartic, and Oriental to Malaya).
11. *Calogale* (Ethiopian, Oriental to Cambodja). This does not appear to be more than a subgenus of *Herpestes*; and, so far as the Indian species are concerned, even this rank is doubtful, it being even a question how far one Indian

- included species is specifically distinct from another placed by Gray himself in *Herpestes*.
12. *Tæniogale* (Oriental). It is doubtful if this even be entitled to more than subgeneric rank; and it is erroneously, I think, ascribed to the Indian province. Jerdon, I believe, correctly states that it is only found in the Malabar province.
 13. *Hyaena* (Palæartic and Oriental; a Palæartic species). This is correct; but whilst other species of the genus are found throughout the Ethiopian region, the family is unrepresented in the Oriental region beyond the limits of the Indian province, with the exception, I believe, of Assam, into which it may have strayed from Bengal.
 14. *Canis* (Palæartic and Oriental to Malaya). Ethiopian as well—typical forms of jackal (e. g. *Canis mesomelus* and *C. variegatus*), wrongly classed by Gray as foxes, being found throughout Africa, whilst jackals are only found as stragglers in Burmah, and are unknown in Malayasia. The wolf (*C. pallipes*) found in India differs a good deal from Palæartic forms, and requires comparison with the Abyssinian *C. simensis*. By Gray this last species and *C. anthus*, a widely spread African species, are made into separate genera, affined to *Lupus*, but I do not know how far the distinction is justified. No wolves are found in Malayasia.
 15. *Cuon* (Oriental to Malaya). Palæartic also. Gray has shown that *Canis alpinus* of Pallas belongs to the genus; and Hodgson states that his *C. primævus* is found in Tibet. A species of *Cuon*, probably *C. alpinus*, is recorded from Western Tibet also.
 16. *Vulpes* (very wide range). Unknown in Malayasia. The South-African *Megalotis* is probably a representative form; and the North-African and south Palæartic *Fennec* certainly are.
 17. *Lutra* (Oriental and Palæartic). No good reason has been assigned for separating the South-African *L. maculicollis*.
 18. *Mellivora* (Ethiopian). Peculiar to the Indian province in the Oriental region, not even known to occur in Malabar.
 19. *Melursus* (Oriental only; family not Ethiopian). The genus *Melursus* is peculiar to India, being replaced in the Himalayas and east of the bay by *Helarctos*; but I doubt if either is more than subgenerically separable from *Ursus*.
 20. *Sus* (Palæartic and Oriental, not Ethiopian). Replaced by an allied genus *Potamochoærus* in the Ethiopian region.

21. *Tragulus* (Oriental). A representative genus, *Hyomoscus*, in West Africa. *Tragulus* in India is confined, I believe, to the Malabar province, the Bengal subprovince of the Indian province, and perhaps the Madras province. I have never been able to hear of its existence in the Gangetic or Deccan subprovinces.
22. *Cervus* (Oriental and Palæartic; family not Ethiopian).
23. *Cervulus* (Oriental; family not Ethiopian). Very local in India except in the Malabar province.
24. *Bibos* (Palæartic and Oriental). Only a subgenus of *Bos*. *Bubalus*, which is omitted, has, I believe, at least as good claims to be considered a Central-Indian form as *Tragulus*. It is aboriginally wild in the Bengal subprovince, part of the Madras subprovince (Northern Ceylon), and in Assam; probably feral only in Malaya; but this is not certain, so I omit it. The original form, *B. palwindicus*, occurs fossil in the Nerbudda valley. It is a thoroughly African genus.
25. *Portax* (Oriental). Indian only; unknown east of the Bay of Bengal, and, so far as I am aware, in the Malabar province. It is a distinctly Ethiopian type, represented by allied genera (*Oreas*, *Tragelaphus*) in Africa.
26. *Gazella* (Palæartic and Ethiopian). Unknown in any part of the Oriental region east of the Panjáb and Sind, except the Indian province, and therein confined to the Gangetic and Deccan subprovinces.
27. *Antilope* (Oriental). } The same as *Portax*; Ethiopian
28. *Tetraceros* (Oriental). } types unknown east of the Bay of Bengal.
29. *Elephas* (Oriental species). The genus, however, is Ethiopian.
30. *Mus* (cosmopolite nearly).
31. *Platacanthomys* (Oriental). Erroneously ascribed to the Indian province. It has only been found in the Malabar hills.
32. *Meriones* (very wide range). Palæartic and found throughout the Ethiopian region. Unknown out of India in the Oriental region. I do not know whether it occurs in Malabar.
33. *Spalacomys* or *Nesokia* (Oriental). Palæartic as well: one species in Baluchistan, another just described from Eastern Turkestan; one of the Indian species inhabits Káshmir. Not known east of India. The only reported occurrence in Burmah, P. A. S. B. 1866, p. 240, requires confirmation.
34. *Sciurus* (almost cosmopolite).

35. *Pteromys* (Palæarctic and Oriental to China and Malaya).
 36. *Hystrix* (wide range).
 37. *Lepus* (wide range). Unknown in Malayasia.
 38. *Manis* (Ethiopian and Oriental to Malaya).

It will be seen that two genera are incorrectly classed as belonging to the Indian province exclusive of Malabar, viz. *Tæniogale* and *Platacanthomys*; and I exclude three others as undeserving of generic rank, viz. *Cynalurus*, *Viverricula*, *Calogale*; on the other hand I add *Tupaia*. These changes reduce the Indian genera to thirty-four. Of these, fourteen are either common to the Ethiopian region (India and Malayasia), or replaced by closely allied forms in one or the other, viz. *Presbytes*, *Sorex*, *Felis*, *Viverra*, *Paradoxurus*, *Herpestes*, *Lutra*, *Sus*, *Tragulus*, *Elephas*, *Mus*, *Sciurus*, *Hystrix*, *Manis*.

The following, eight in number, are Oriental forms, being represented by identical or closely allied species, or nearly affined generic types in Malayasia, and not represented by allied forms in Africa—*Macacus*, *Tupaia*, *Cuon*, *Melursus*, *Cervus*, *Cervulus*, *Bibos*, *Pteromys*. Every one of these is more or less Palæarctic also, except *Cervulus* and *Tupaia*.

The following, ten in number, are Ethiopian forms, being represented by allied species or genera in the Ethiopian region, whilst they are not similarly represented in the Malay countries—*Erinaceus*, *Hyæna*, *Canis*, *Mellivora*, *Portax*, *Gazella*, *Antilope*, *Tetraceros*, *Meriones*, *Lepus*. Of these, *Mellivora*, *Portax*, *Antilope*, *Tetraceros* are unrepresented in the Palæarctic region.

I think, bearing in mind that India has probably for ages been separated from Africa and united to the Malay countries, it could hardly be expected that stronger African affinities would be found in the fauna. I think it is evident that, so far as the Mammalia are concerned, the Ethiopian affinities of the Indian province are stronger than the Oriental.

Birds.—Mr. Wallace says that “the naturalists who have adopted the ‘Ethiopian theory’ of the fauna of Hindustan have always supported their views by an appeal to the class of birds.” I think Mr. Wallace is mistaken. I do not think I have ever especially quoted the evidence of the birds; nor do I consider it quite so strong as that of the mammals, though I think I shall be able to show that the number of Oriental forms in the Hindustan fauna is much overrated, and some important Ethiopian affinities overlooked, by Mr. Wallace.

In the first place, Mr. Wallace’s lists consist chiefly of Passeres; and there are few orders throughout the animal kingdom, so far as I know, in which the accepted generic

distinctions are slighter and the generic affinities more complicated. Secondly, the power of flight gives birds peculiar facilities for extending their range; and it is only natural that many forms should straggle into the province from the neighbouring Himalayas, the Assam hills, and the Malabar region. Hence in parts of the Bengal and Madras subprovinces a few Malay forms are found which do not occur elsewhere in India. Moreover certain species are to be met with, on hills which rise to a considerable height, even in Central India. Thus *Myiophonus Horsfieldi* has been found in Sirgúja on Main Pat, at Chikalda in Berar, at Pachmari, and at Mount Abú, all of them hills rising to about 4000 feet or more above the sea. At one of these localities, Chikalda, *Hypsipetes ganessa* was also shot, and it is said the typically and peculiarly Malabar genus *Ochromela* was seen. To include the birds found on these very few isolated hill-tops in a list of the general fauna of the surrounding country gives a completely false idea. Is *Fregilus graculus* to be included in the forms characteristic of the Ethiopian fauna because it inhabits the mountains of Abyssinia? I have not time at present to enter into the subject of these isolated remnants of a fauna which once in all probability was more extensively diffused, though I by no means think it inhabited the whole of India. It certainly, however, must be omitted in estimating the fauna of the surrounding country.

Mr. Wallace gives a list of eighty-four Oriental genera of birds found in Central India. Now, of these, twelve, viz. *Layardia*, *Garrulax*, *Trochalopteron*, *Alcippe*, *Hypsipetes* (with the exception mentioned above), *Irena*, *Arachnothera*, *Hemicircus*, *Mulleripicus*, *Nyctiornis*, *Batrachostomus*, and *Collocalia*, have never been found, so far as I am aware, in the Indian peninsula, except in the Malabar province; three others, *Hemichelidon*, *Niltava*, and *Perdix* are not known to occur south of the Himalayas, the last named, as generally restricted, being found no nearer than Tibet, and not being an Oriental genus at all. Mr. Wallace probably includes *Perdicula* in *Perdix*. This, however, is, so far as known, a form peculiar to India and Ceylon, the Timor *P. Raalteni* being apparently but dubiously affined.

Of the remaining genera, twenty-one, viz. *Abrornis* (one species only, *A. cantator*), *Larvivora*, *Hemipus*, *Pellorneum*, *Dendrophila*, *Chibia*, *Chaptia*, *Nectarophila*, *Dicæum*, *Eulabes*, *Nemicola*, *Gecinus*, *Tiga*, *Micropternus*, *Rhopodytes*, *Surniculus*, *Harpactes*, *Ceyx*, *Hydrocissa*, *Carpophaga*, and *Chalcophaps*, are not, to the best of my knowledge, found outside the Bengal and Madras subprovinces; and I suspect *Megalurus*

and *Pelargopsis* have only been found as occasional stragglers beyond the limits. *Myiophonus* I have already mentioned. These birds may be found in a few isolated hills even in the Deccan and Gangetic subprovinces; but they are not found generally. To prevent being misunderstood, I should add that, when I say not found generally, I mean not found even in the great forests, such as those of the Nerbudda and Tapti valleys, so far as I am aware. Some of the forests in these countries, and especially those of the Satpura ranges, are very extensive: I have passed months in them at a time; and although, as I was not collecting, I might easily have overlooked the smaller birds, I could not have failed to remark conspicuous forms like *Hydrocissa*, *Carpophaga*, and *Chalco-phaps*.

Five genera, viz. *Malacocercus*, *Piprisoma*, *Tuccocua*, *Ortygornis*, and *Galloperdix*, are, I believe, peculiar to India and Northern Ceylon. Mr. Wallace makes *Malacocercus* extend to the Philippines; but I do not find the genus in Lord Walden's list*. *Ortygornis* is apparently by Mr. Wallace made to include *Rhizothera*. I have no means of judging how far this is accurate; but *Ortygornis* appears to me affined to some of the African Francolins, e. g. *F. gutturalis*. I cannot agree with Jerdon in looking upon *Galloperdix* as allied to *Gallus*, or with Blyth (Ibis, 1867, p. 157) in considering that it is a representative of *Polyplectron*, or still less of *Ithaginis*. It is quite as much like some African Francolins, e. g. *F. Erkelii*.

Six more genera are certainly Ethiopian as well as Oriental. They are:—*Chatarrhœa*, to which certain South-Palæartic and African species belong, and which is now united by most ornithologists with the African *Crateropus*; *Cittacincla*, identical with the Ethiopian genus *Cercotrichas*; *Arachnechthra*, to which a number of African species belong (*Nectarinia habessinica*, for instance); *Pitta* and *Treron*, included by Mr. Wallace himself in the Ethiopian fauna; and *Meniceros*, which is not separable from the Ethiopian genus *Toccus*. I believe this list might be largely extended.

Lastly, of two genera, *Pastor* and *Erythrosterna*, the only species of the former found in the Indian province is a migratory Palæartic form, which does not extend to the east of India; and the only species of *Erythrosterna* found commonly in the Deccan and Gangetic provinces is the European *E. parva*. Other migratory forms, however, are found in the Bengal and Madras subprovinces; and an occasional straggler

* Tr. Z. S. ix. p. 189.

may occur in other parts of the Indian peninsula. If these migratory forms are taken into consideration, why are the *Saxicolæ*, with their strong African affinities, omitted? I have shot two species of *Saxicola* at Nágpúr.

I thus am obliged to exclude no less than forty-six out of eighty-seven Oriental genera, either because they are not found in the portion of Central India in which the proportion of African forms is most marked, or because they are not characteristically Oriental forms.

Of the forty-eight genera of wide range I have very little to say, except that *Calandrella* and *Ammomanes* are not found to the east of the Bay of Bengal, whilst both are represented in the Ethiopian region, *Calandrella* being certainly allied to some forms of *Megalophonus*; whilst the only species of *Coccytes* (*C. jacobinus*) is Ethiopian, being found even in Southern Africa. It extends to Upper Burmah, where it consorts with a few other Indian forms with African affinities, e. g. *Crateopus gularis* and *Francolinus Phayrei* vel *sinensis*; but it is not, so far as I am aware, found in Malayasia. Mr. Hume has not apparently received it from Tenasserim.

The list of Palæarctic genera occurring in Central India might perhaps be increased; but, as nearly all are migratory, they are of trifling importance.

Lastly we come to the Ethiopian genera. By the omission of the *Raptores* and *Grallæ*, seven of the most striking and remarkable cases of African forms found in India and unrepresented east of the Bay of Bengal are omitted; these are *Neophron*, *Chicquera*, *Rhinoptilus*, *Cursorius*, *Sypheotides*, *Eupodotis*, and *Phœnicopterus*. *Neophron*, *Cursorius*, and *Phœnicopterus* extend, it is true, into the southern portion of the Palæarctic region; but the Palæarctic species of *Cursorius* is confined to the Panjáb province in India, and the Indian province is inhabited by a peculiar species. *Sypheotides* appears to me congeneric with the African *Lissotis*. In both genera the males undergo the same peculiar change of plumage, becoming black in the breeding-season. The case of *Rhinoptilus* is very remarkable. The Indian species is very rare, and only known to occur in part of the Madras subprovince. If we had only this one species, it would be impossible to deny the existence of a distinct African element in the Indian fauna. Another African form unrepresented to the eastward is *Cercomela*.

I regret that I cannot now go more thoroughly into this matter and classify the birds as I have attempted to do the mammals. Before doing so it would be necessary to compare a large number of African genera with Indian. I notice in

Mr. Wallace's lists that the only families of birds found in India which are not Ethiopian are the *Certhiidae*, *Phyllornithidae*, and *Artamidae*, each of which is represented by but a single species in Central India. In the Himalayas and in the countries immediately to the eastward of India, five additional non-African families are found, according to Mr. Wallace's classification, viz. :—*Panuridae*, *Liotrichidae*, *Pachycephalidae*, *Eurylaimidae*, and *Podargidae*. The following Ethiopian families are also Indian, but not found in any other part of the Oriental region so far as I know—*Pteroclididae*, *Otididae*, *Cursoridae*, *Phœnicopteridae**; so that there are actually more families of birds found in India which are not found in Burmah even, than there are which are not also represented in Africa. In Mr. Blyth's lists of Burmese birds (J. A. S. B. 1875) the following families are included which are not found in the Indian province—*Henicuridae*, *Garrulacidae*, *Liotrichidae*, *Pipridae*, *Eurylaimidae*. It should be remarked that Mr. Blyth's families differ materially from Mr. Wallace's; but the result in this respect is the same. If, now, we proceed to calculate the number of species belonging to the families, and to limit to the true characteristic subprovinces the area of the Indian province compared, the result will be far more startling.

	Families.	Species.
1. Found in the typical subprovinces of India, but unknown in Africa . . .	3	comprising 3
N.B. Of these three families, one, <i>Artamidae</i> , is principally Australian; another, <i>Certhiidae</i> , is chiefly Palæarctic, and is only represented to the east of India by one species in the Philippine Islands.		
2. Found in the same subprovinces and common to Africa, but unknown east of the Bay of Bengal even in Burmah (<i>Pteroclididae</i> 3 species, <i>Otididae</i> 3 species, <i>Cursoridae</i> 1 species, <i>Phœnicopteridae</i> 2 species) . . .	4	,, 9
3. Found in Burmah†, but unrepresented in the typical subprovinces of India (<i>Trogonidae</i> 2 species, <i>Henicuridae</i> 4, <i>Garrulacidae</i> 15, <i>Liotrichidae</i> 10, <i>Pipridae</i> (<i>Calyptonema</i>) 1, <i>Eurylaimidae</i> 8)	6	,, 40

* *Gruidae* might be added if India be compared with Malayasia; but cranes are said to occur in Upper Burmah and in China.

† Taken from Mr. Blyth's lists, *l. c.*

Moreover the following are the relative number of species of some peculiarly characteristic Indo-Malayan families in Burmah, according to Blyth's list, and in the above named subprovinces of India:—

	Burmah.	Deccan and Gangetic subprovinces.
<i>Bucerotida</i>	6	1
<i>Alcedinida</i>	12	3 or 4
<i>Picida</i>	29	4
<i>Pittida</i>	6	1
<i>Timeliida</i>	31	3

The last list is very important, because it shows in a striking manner the most prominent difference between the Malay countries and India—the extremely rich fauna of the one as compared with that of the other, and the great disproportion of representatives of the same families. The truth is that the characteristic Oriental genera are not nearly so abundant or so well represented in India as is generally supposed.

I pass on to the Reptilia; and here I must say that Mr. Wallace's information appears to have misled him. He states, (p. 326) that *Tropidococcyx* is peculiar to the subregion, and *Aspidura*, *Passerita*, and *Cynophis* to the peninsula and Ceylon. Now *Tropidococcyx* and *Aspidura* have not, so far as I know, ever been found in the subregion at all; the only localities I can find for the former are North Canara and the Nilgiri hills, both in the Malabar subregion; whilst *Aspidura*, so far as I can judge from the evidence, is confined to Ceylon, though it also is probably found in Malabar. *Cynophis Helena* I suspect to be a Malabar form also, although it may be found in the Madras subprovince; *Passerita* is common enough in the Bengal subprovince, but is certainly not known in the Deccan or the Gangetic area.

Next, Mr. Wallace gives, as characteristic genera and characteristically Oriental, *Dipsas*, *Simotes*, *Bungarus*, *Naja*, *Trimeresurus*, *Lycodon*, and *Python*. I cannot admit that the list is either accurate or complete. To the best of my belief *Simotes* and *Trimeresurus* are only found in the Bengal and Madras subprovinces; and I strongly suspect the same might be said of *Python*, though I may be mistaken. *Naja* may be characteristically Oriental; but it is quite as characteristically Ethiopian; and one species is Palæartic, *Tomyrus oxiana* having been shown, if I am not mistaken, to belong to the genus. *Dipsas*, too, is found in Africa.

Then *Eumeces*, *Pentadactylus*, *Gecko*, *Eublepharis*, and *Draco* are characteristically or wholly Oriental, according to

Mr. Wallace. This I grant, with the exception of *Eublepharis*, which is not found outside the Indian province in the Oriental region, nor represented by any allied form, whilst it appears very probable that it is allied to the West-African *Psilodactylus*, as Gray suggested. Neither *Pentadactylus*, *Gecko*, nor *Draco* is found anywhere in the Indian province at all. By *Eumeces* I presume the genus as enlarged by Günther is meant; if so, it is the only genus of the five which can be quoted as in any way supporting Mr. Wallace's view. It is represented in the Indian province by one species of *Mocoa* and two of *Riopa* *; now in Gray's 'Catalogue of Lizards in the British Museum' I find a *Mocoa* quoted from West Africa, and a *Riopa* from Arabia.

The commonest and most characteristic Indian genera of Lacertilia and Ophidia are the following:—*Varanus*, *Cabrita*, *Ophiops*, *Euprepes*, *Hemidactylus*, *Sitana*, *Calotes*, *Charasia*, *Chamaeleo*, *Typhlops*, *Ptyas*, *Zamenis*, *Tropidonotus*, *Lycodon*, *Eryx*, *Naja*, *Bungarus*, *Daboia*, and *Echis*. Of these the only characteristically Oriental genera are *Calotes*, *Lycodon*, *Bungarus*; whilst *Cabrita* (allied to *Eremias*), *Charasia* (very near to *Stellio*), *Chamaeleo*, *Eryx*, and *Echis* have distinct Ethiopian affinities, and *Sitana* is restricted to India. The following families are Ethiopian and Indian, but not Malayan—*Chamaeleontidae* (1 species) and *Erycidae* † (2 species). The following are Indian and Malayan but not Ethiopian—*Oligodontidae*, represented by one species in the typical Indian sub-provinces, and *Crotalidae*, which are not known to occur in them at all.

It is true that of the Amphibia not a single family exhibits special Ethiopian affinities; but the genus *Pyrixcephalus* does so most unmistakably. This genus has not been found east of the Bay of Bengal.

Before concluding these few remarks, there is a point to which I think it well to call attention, as it is one which has largely influenced me in insisting on the African affinities of the Indian fauna. This is the evidence that in Northern and Central India the fauna in the later Tertiary times was more allied to that of Africa at present than it now is. This is shown by the presence of *Hippopotamus*, *Camelopardalis*, *Loxodon*, and a number of antilopine forms in the Pliocene

* I have not met with this genus in either the Deccan or the Gangetic subprovince.

† The statement that *Eryx* and *Gongylophis* occur in Sikkim has been shown to be an error. It depends on the localities affixed to the specimens collected by the Messrs. v. Schlagintweit, many of whose localities are untrustworthy. See P. A. S. B. 1870, p. 77; J. A. S. B. 1871, p. 421.

fossil fauna of the Sevaliks, and of a *Rhinoceros* belonging to the African type (*R. deccanensis*, Foote) in the Deccan. In the Pleistocene fauna of the Nerbudda buffaloes are found with a species of round-horned *Bos* (*B. namadicus*), now replaced in the same region by the flat-horned Malayan *Bos* (*Bibos*) *gaurus*. Of course the round-horned bovine is not African; but neither is it Malay. My belief is that the vertebrate fauna of India contains three elements, derived at three different periods from countries which were or had been in connexion with Africa. The first of these consists of the forms common to the Ethiopian and Oriental region. These are in India the bulk of the fauna. It is scarcely necessary to quote examples; but the *Viverride*, *Tragulide*, *Manidide*, *Megalomide*, *Bucerotide*, and *Pycnonotide* will serve as characteristic illustrations. The second consists of forms common to the Ethiopian region and India, but which do not extend to the eastward of the Bay of Bengal; nor are they represented in the portion of South-western Asia now lying on the direct line between India and Africa: such are *Mellivora*, *Antilope*, *Portax*, *Tetraceros* amongst mammals, *Sypheotides*, *Rhinoptilus*, *Chicquera*, *Thamnobia* amongst birds. The third is composed of species with Ethiopian affinities, which may have wandered into India from Arabia and Baluchistan: such are *Gazella Bennetti* and *Neophron percnopterus*. In the case of many Ethiopian forms inhabiting India, e. g. *Pyrrhulauda grisea*, *Eupodotis Edwardsi*, &c., it is not easy to say to which of the two latter classes they belong, as they are represented by closely allied forms in South-western Asia. But there can be very little doubt of the animals of the second group having entered India by a line of communication which no longer exists (some of them, e. g. *Tetraceros* and *Rhinoptilus*) being forest forms not found in open country.

I regret that want of time prevents my entering more thoroughly into this subject. I have tried to weigh the evidence fairly; and I think I have shown that my belief in the presence of a marked African element in the Indian fauna is not due to a confusion between "station" and "habitat." From what is known of the distribution of the Mollusca, Insecta, and Arachnida, I believe that the evidence afforded by the Invertebrata coincides with that of the Vertebrate fauna.

Calcutta, August 6, 1876.